DETAILED ACTION

1. This is the initial office action based on the 10/802,660 application filed on March 17, 2004. Claims 1-12, as originally filed, are currently pending and have been considered below.

Priority

2. Applicant's claim for the benefit of a prior-filed application under 35 U.S.C. 119(e) or under 35 U.S.C. 120, 121, or 365(c) is acknowledged. Applicant has not complied with one or more conditions for receiving the benefit of an earlier filing date under 35 U.S.C. 119 as follows: a certified copy of the original foreign document, Chinese Patent Application No. 03118858.3, has not been submitted.

Specification

3. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

4. The disclosure is objected to because of the following informalities: reference number "9" of Figure 1 is referred to as "6" in the disclosure.

Appropriate correction is required.

Information Disclosure Statement

5. The listing of references in the specification is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information

submitted for consideration by the Office, and MPEP § 609.04(a) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered. Namely, US 5,418,881A is not cited in the IDS.

Claim Objections

6. Claim 5 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. The frequency, amplitude, and non-twisted components of the waveform are properties established by the previously claimed process, and therefore do not further limit the claim.

Claim Rejections - 35 USC § 112

7. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

8. Claim 5 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The applicant does not provide a

definite method step achieving the claimed waveform limitations. As best can be interpreted by the examiner, it is the method steps of the parent claim that achieve these limitations.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

11. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

12. Claims 1-4 and 6-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hart Jr. et al (USPN 5,298,047) in view of Blaszyk et al (USPN 6,324,872 B1).

Regarding claim 1, Hart, Jr. et al teaches a method for manufacturing low PMD single-mode fiber comprising the step of: fixing a perform to a feeding mechanism at the top of a fiber drawing tower (Column 3 lines 45-48); sending said perform into a fiber-drawing heating furnace and performing the fiber-drawing process therein (Figure 1 #12); making the drawn fiber to pass through bare fiber geometrical dimension monitor (14), coating system (15), twisting system (21), fiber-drawing tension wheel (20), finished optical fiber geometrical dimension monitor system (18), and take-up system successively (Figure 1), wherein said fiber is forced to spin round its axis under the action of the torque introduced by said twisting system (Column 4 lines 10-20); the spin direction of said fiber is changed periodically along with the back and forth swing of twisting wheel in a plane that is parallel to said fiber (Column 4 lines 50-66)), and a special mechanical wave is formed; said mechanical wave propagates along the fiber towards the upstream fiber-drawing direction and attains the softened region of a preform in said fiber-drawing furnace; said mechanical wave causes a plastic deformation of the glass material in said softened region, and said deformation is set up in the newly drawn fiber (The mechanical wave, its propagation, and the resultant deformation are inherent characteristics of the above method containing low horizontal twisting (Column 4 lines 10-20) as described in applicant's disclosure of prior art (Paragraph 10)); and the driving force introduced by said twisting system indirectly exerts to the fiber, and the driving force for twisting fiber originates from the friction between said fiber moving in the fiber-drawing direction and said twisting wheels (Column 4 lines 35-45).

Regarding claim 2, Hart Jr. et al teaches the method of manufacturing low PMD single-mode fiber according to claim 1, as discussed above.

Regarding claim 3, Hart Jr. et al teaches the method of manufacturing low PMD single-mode fiber according to claim 1, as discussed above, wherein the twist of the fiber is realized through the following manner: when there is a slope angle between the plane in which said twisting wheels are located and the fiber-drawing direction, the moving fiber brings along said twisting wheels to rotate round their axes respectively through friction, the fiber radial component of the angular velocity for the rotation of said twisting wheels applies reaction on said fiber through friction, and the twist of the fiber is produced (Column 4 lines 20-31).

Regarding claim 4, Hart Jr. et al teaches the method of manufacturing low PMD single-mode fiber according to claim 1, as discussed above, wherein the typical mean value of the turns per meter of said twisted fiber ranges from 25 to 100 turns/m (Figure 6), and the typical PMD coefficient of said fiber is not greater than 0.03 $ps/km^{1/2}$ (Column 2 lines 25-28).

Regarding claim 6, Hart Jr. et al teaches the method of manufacturing low PMD single-mode fiber according to claim 1, as discussed above.

Regarding claim 7, Hart et al teaches the method of manufacturing low PMD single-mode fiber according to claim 3, as discussed above.

Regarding claim 8, Hart Jr. et al teaches the method of claim 1, as discussed above.

Regarding claim 9, Hart Jr. et al teaches the method of manufacturing low PMD single-mode fiber according to claim 8, as discussed above, wherein the twist is produced by said twisting system, and it can be controlled through the control of the swing angle of the twisting

wheels and the proportion of time distribution among three motion forms (Column 4 lines 20-52).

Regarding claim 10, Hart Jr. et al teaches the method of manufacturing low PMD single-mode fiber according to claim 9, as discussed above, wherein the typical value of the maximum slope angle swinging by the plane in which said twisting wheels are located ranges from 5 to 20 degrees (Figure 4).

Regarding claim 11, Hart Jr. et al teaches the method of manufacturing low PMD single-mode fiber according to claim 1, wherein said fiber preform may be a solid preform or a fiber preform prepared by rod-in-tube process (Column 3 lines 45-47), the typical value of the outer diameter of said preform ranges from 40 mm to 150 mm, the typical fiber-drawing speed of said fiber-drawing tower ranges from 400 m/min to 1500 m/min (Column 3 lines 63-64),

Regarding claim 12, Hart Jr. et al teaches the method of manufacturing low PMD single-mode fiber according to claim 1, as discussed above, wherein the typical mean value of the twist of said fiber is 25~100 turns/m (Figure 6); the distribution waveform of the twist of the fiber in the length direction are different forms to combine periodically constant amplitude components and constant frequency components with variable amplitude components and variable frequency components; and the typical value of the coefficient of PMD of the optical fiber is not greater than 0.03 ps/km$^{1/2}$ (Column 2 lines 26-27).

Regarding claim 1, Hart Jr. et al does not explicitly disclose a pair of twisting wheels of said twisting system apply their action on said fiber, the swing direction and the axial slope angle to the fiber of the plane in which the two twisting wheels are located and the axis of said fiber are

always in axial symmetrical state, and said two twisting wheels always apply a given compressive stress on said fiber.

However, Blaszyk et al does disclose a pair of twisting wheels of said twisting system apply their action on said fiber (Column 10 lines 47-55), the swing direction and the axial slope angle to the fiber of the plane in which the two twisting wheels are located and the axis of said fiber are always in axial symmetrical state (Figures 6 and 8), and said two twisting wheels always apply a given compressive stress on said fiber (Column 11 lines 25-27).

Regarding claim 2, Hart Jr. et al does not explicitly disclose wherein the magnitude of said compressive stress is typically 0.5~5N.

However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use this magnitude of stress, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art (*In re Aller,* 105 USPQ 233), so that a good friction between said fiber and said twisting wheels is ensured. The examiner notes that “good friction,” as claimed, is an intended result of the aforementioned process and does not further limit the claim.

Regarding claim 6, Hart Jr. et al does not explicitly disclose wherein said twisting system has a pair of positioning wheels, the plane in which said positioning wheels are located and the plane in which the moving twisting wheels are located are always perpendicular each other, the outer surface of said positioning wheels do not apply compressive stress on the fiber.

However, Blaszyk et al does disclose wherein said twisting system has a pair of positioning wheels (Figure 6 #226), the plane in which said positioning wheels are located and

the plane in which the moving twisting wheels are located are always perpendicular each other, the outer surface of said positioning wheels do not apply compressive stress on the fiber (Column 12 lines 27-44).

Regarding claim 7, Hart et al does not explicitly teach wherein a hard alloy having high polish precision may be selected as the material of said twisting wheels or said positioning wheels of said twisting system that contact with said fiber directly, the value of the surface roughness thereof is 3 microns, ceramic material, hard rubber material or plastic material may also be selected.

However, Blaszyk et al does disclose wherein a hard alloy having high polish precision may be selected as the material of said twisting wheels or said positioning wheels of said twisting system that contact with said fiber directly, the value of the surface roughness thereof is 3 microns, ceramic material, hard rubber material or plastic material may also be selected (Column 10 lines 34-47).

Regarding claim 8, Hart et al does not explicitly disclose wherein the motion formed by said twisting wheel has three forms: a pair of twisting wheels are stable in their vertical positions simultaneously; a pair of axes of twisting wheels are stable in their maximum slope angle positions symmetrically; and a pair of axes of said twisting wheels swing symmetrically between their vertical positions and maximum slope angle positions.

However, Blaszyk et al does disclose wherein the motion formed by said twisting wheel has three forms: a pair of twisting wheels are stable in their vertical positions simultaneously; a pair of axes of twisting wheels are stable in their maximum slope angle positions symmetrically;

and a pair of axes of said twisting wheels swing symmetrically between their vertical positions and maximum slope angle positions (Figure 8).

Regarding claim 11, Hart Jr. et al does not explicitly disclose said fiber-drawing heating furnace includes mainly graphite resistance furnace and graphite induction furnace, the typical value of fiber-drawing temperature ranges from 1730° C to 2300° C.

However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the diameter and temperature ranges, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use a graphite resistance or induction furnace, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin,* 125 USPQ 416.

Hart Jr. et al and Blaszyk et al are analogous art because they are from the same field of endeavor, introducing spin in optical fibers.

It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the process of Hart Jr. et al with the pair of twisting wheels of Blaszyk et al because the pair of twisting wheels allows the process to process to provide non-uniform spin and particularly alternating spin in opposite directions to the fibers in a repeatable, controllable manner (Hart Jr. et al Column 3 lines 29-34)

The motivation for modifying the Hart Jr. et al reference with the teaching of Blaszyk et al would have been that non-uniform spinning reduces the effects of PMD, namely undesirable distortion of the light pulses or waves transmitted along the fiber which reduce the signal quality and limit the rate at which information can be passed along the optical fiber (Blaszyk et al Column 2 lines 36-40).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael T. Piery whose telephone number is 571-270-5047. The examiner can normally be reached on M-Th 7:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joe Del Sole can be reached on (571)272-1130. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

MTP

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